HT12D

Integrated circuits
Special Function

ELEKTOR ELECTRONICS
DATASHEET 2/2000

HT12D
2^{12} Series of Decoders

Manufacturer
Holtek Semiconductor Inc.,

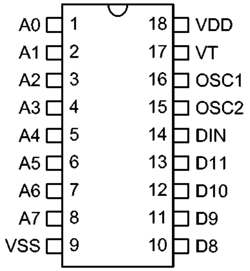
HOLTEK

No.3 Creation Rd. II, Science-based Industrial Park,
Hsinchu, Taiwan, R.O.C. Fax: 886-3-563-1189.
Internet: http://www.holtek.com.tw

Features (HT12D only)
- Operating voltage: 2.4V-12V
- Low power and high noise immunity CMOS technology
- Low standby current
- Capable of decoding 12 bits of information
- Pair with Holtek's 2^{12} series of encoders
- Binary address setting
- Received codes are checked 3 times
- Address/Data number combination
- 8 address bits and 4 data bits
- Built-in oscillator needs only 5% resistor
- Valid transmission indicator
- Easy interface with an RF or an infrared transmission medium
- Minimal external components

Application example
IR Remote Control for Sony MZ-R30 MiniDisc Walkman, *Elektor Electronics* February 2000.

8-Address
4-Data



HT12D
–18 DIP
Pin Assignment

Pin Descriptions			
Pin Name	**I/O**	**Internal Connection**	**Description**
A0 – A11	I	NMOS TRANSMISION GATE	Input pins for A0-A11 setting. They can be externally set to VDD or VSS
D8 – D11	O	CMOS OUT	Output data pins
DIN	I	CMOS IN	Serial data input pin
VT	O	CMOS OUT	Valid transmission, active high
OSC1	I	OSCILLATOR	Oscillator input pin
OSC2	O	OSCILLATOR	Oscillator output pin
VSS	I	—	Negative power supply (GND)
VDD	I	—	Positive power supply

HT12A

Integrated circuits
Special Function

ELEKTOR ELECTRONICS
DATASHEET 2/2000

HT12A
2^{12} Series of Encoders

Manufacturer
Holtek Semiconductor Inc.,

HOLTEK

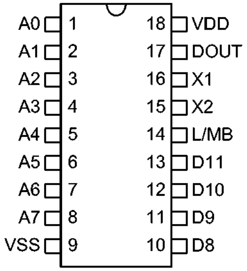
No.3 Creation Rd. II, Science-based Industrial Park,
Hsinchu, Taiwan, R.O.C. Fax: 886-3-563-1189.
Internet: http://www.holtek.com.tw

Features (HT12A only)
- Operating voltage 2.4V- 5V
- Low power and high noise immunity CMOS technology
- Low standby current: 0.1μA (typ.) at V_{DD} =5V
- 38kHz carrier for infrared transmission medium
- Minimum transmission: one word
- Built-in oscillator needs only 5% resistor
- Data code has positive polarity
- Minimal external components
- 18-pin DIP or 20-pin SOP package available

Application example
IR Remote Control for Sony MZ-R30 MiniDisc Walkman, *Elektor Electronics* February 2000.

General Description
The 2^{12} encoders type HT12A and HT12E are CMOS LSIs for remote control system applications. They are capable of encoding information which consists of N address bits and 12–N data bits. Each address/data

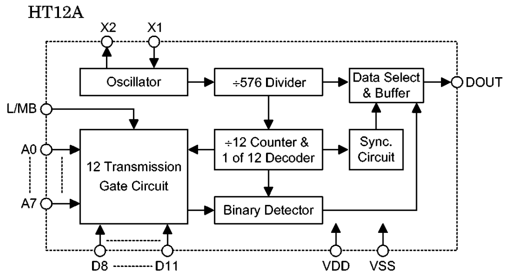
8-Address
4-Data



HT12A
–18 DIP
Pin Assignment

Pin Descriptions (HT12A only)			
Pin Name	**I/O**	**Internal Connection**	**Description**
A0 – A7	I	CMOS IN, pull-high	Input pins for A0-A7 setting. These pins can be externally set to VSS or left open
D8 – D11	I	CMOS IN, pull-high	Input pins for data D8-D11 setting and transmission enable, active low. These pins can be externally set to VSS or left open
DOUT	O	CMOS OUT	Encoder data serial transmission output
L/MB	I	CMOS IN pull-high	Latch/Momentary transmission format selection pin. Latch: floating or VDD. Momentary: VSS
OSC1	I	OSCILLATOR 1	Oscillator input pin
OSC2	O	OSCILLATOR 1	Oscillator output pin
X1	I	OSCILLATOR 2	455 kHz resonator oscillator input
X2	O	OSCILLATOR 2	455 kHz resonator oscillator output
VSS	I	—	Negative power supply (GND)
VDD	I	—	Positive power supply

DATA trigger



HT12A Block Diagram

input can be set to one of the two logic states. The programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal. The capability to select a DATA trigger on the HT12A further enhances the application flexibility of the 2^{12} series of encoders. The HT12A provides a 38kHz carrier for infrared systems.

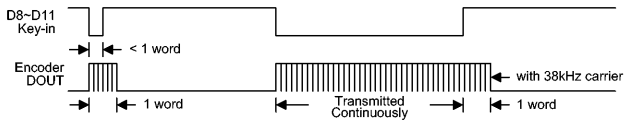
Functional description

Operation

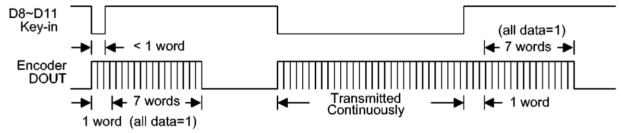
The HT12A encoder begins a 4-word transmission cycle upon receipt of a transmission enable (D8-D11, active low). This cycle will repeat itself as long as the transmission enable (D8-D11) is held low. Once the transmission enable returns high the encoder output completes its final cycle and then stops as shown in the transmission timing diagram.

Information word

If L/MB = 1 the device is in the latch mode (for use with the latch type of data decoders). When the transmission enable is removed during a transmission, the DOUT pin outputs a complete word and then stops. On the other hand, if L/MB = 0 the device is in the momentary mode (for use with the momentary type of data decoders). When the transmission enable is removed during a transmission, the DOUT outputs a complete word and then adds 7 words all with the ‘1’ data code.

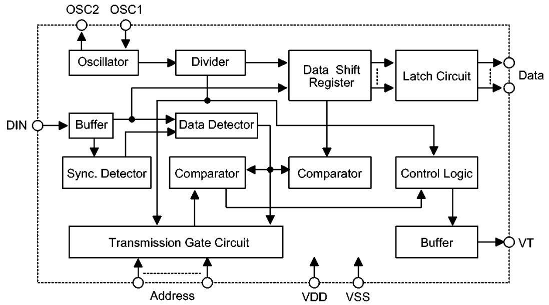


Transmission timing for the HT12A (L/MB=Floating or VDD)



Transmission timing for the HT12A (L/MB=VSS)

Transmission timing for HT12A (L/MB = VSS)



HT12D Block Diagram

General Description

The HT12D decoder is a CMOS LSIs for remote control system applications. It is paired with Holtek’s 2^{12} series of encoders. For proper operation, a pair of encoder/decoder with the same number of addresses and data format should be chosen. The decoders receive serial addresses and data from a programmed 2^{12} series of encoders that are transmitted by a carrier using an RF or an IR transmission medium. They compare the serial input data three times continuously with their local addresses. If no error or unmatched codes are found, the input data codes are decoded and then transferred to the output pins. The VT pin also goes high to indicate a valid transmission.

The HT12D decoder is capable of decoding information consisting of N bits of address and 12–N bits of data. The HT12D is arranged to provide 8 address bits and 4 data bits.

Functional description

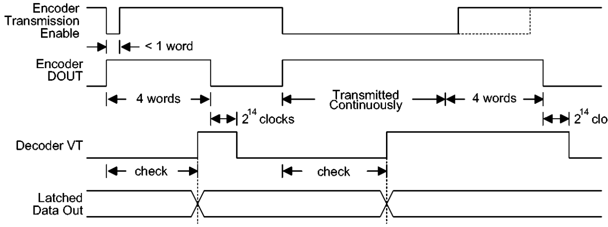
Operation

The HT12D decoder receives data that are transmitted by an encoder and interpret the first N bits of code period as addresses and the last 12–N bits as data, where N is the address code number. A signal on the DIN pin activates the oscillator which in turn decodes the incoming address and data. The decoders will then check the received address three times continuously. If the received address codes all match the contents of the decoder’s local address, the 12–N bits of data are decoded to activate the output pins and the VT pin is set high to indicate a valid transmission. This will last unless the address code is incorrect or no signal is received. The output of the VT pin is high only when the transmission is valid. Otherwise it is always low.

Output type

The HT12D provides 4 latch type data pins whose data remain unchanged until new data are received.

Decoder timing



Decoder timing for HT12D